SOMATIC SENSITIVITY ASSESSMENT

Differences between males and females

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INTRODUCTION

Nociception is a neural process of codification and processing of intense **noxious mechanical**, **thermal** and **chemical stimulus** (Basbaum *et al*. 2009).

This physiological process is widely assessed and the studies show that **women** present a **higher prevalence** than **men** in chronical pain (Fillingim, 2010). In order to recruit further information from somatic pathologies involved with nociception and between genders, there is the need to study nociceptive responses not only in the **clinical field**, but also in the **experimental** one.

There are many **nociceptive tests** that allow the **assessment of pain**, but in this project only three of them were selected. The principal aim of this study was to demonstrate the experimental evidence of **differences** between **female** and **male** mice. The results can highlight the importance of the study of both genders, in the assessment of somatic pain.

OBJECTIVES

- To validate the **nociceptive response** from healthy Swiss CD1 mice under mechanical, thermal and chemical stimulus.
- To validate if there are **differences**, in the nociceptive response, **between males and females**.

MATERIALS

30 males and **28 females Swiss CD1 mice** were used. The division of the animals, for each test, is reflected in the following lines:

- 5 females and 6 males in the von Frey test.
- 11 females and 12 males in the tail immersion test.
- 12 females and 12 males in the formalin test.

METHODS

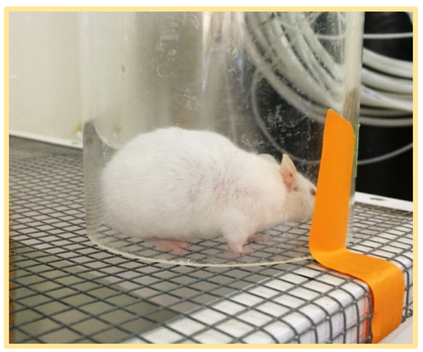

Fig. 1. Mouse above the wire mesh were the von Frey test was performed.

Von Frey test

This test allows the assessment of the **mechanical sensitivity**, by using the von Frey filaments. The procedure consists on putting the animal on a wire mesh (**Fig. 1**) applying a hair until it bends, and then maintain it during 5 seconds.

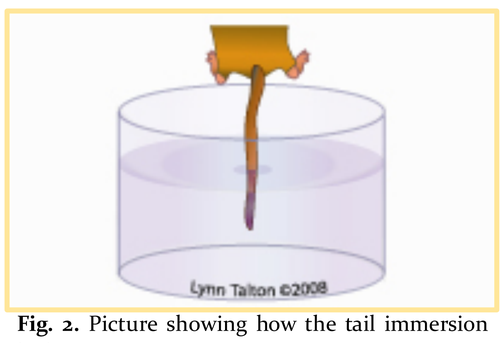

Fig. 2. Picture showing how the tail immersion test was run.
http://btc.psych.ucla.edu/neuroscreen.htm

Tail immersion test

This experiment consists on the **application** of a **high-intensity thermal stimulus** (Bannon & Malmberg, 2007), by the immersion of the mice tail in a water bath at 52ºC, as shown in **Fig. 2.**

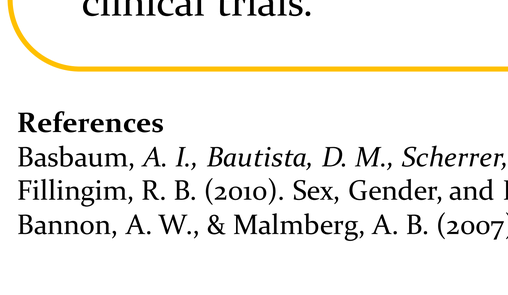

Fig. 3. Reaction produced by the subcutaneous formalin injection in the dorsal surface of the right hind paw.

Formalin test

The formalin test permits the assessment of the behavioural response of the mice after **injecting formalin subcutaneously** in the dorsal surface of the hind paw, as the **Fig. 3.** shows.

RESULTS

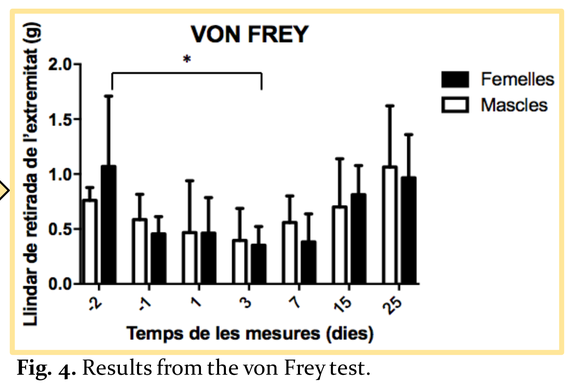

Fig. 4. Results from the von Frey test.

Results from the von Frey test

Show **statistical significance**, in females, for the **time elapsed** between the recorded baseline data (**Fig. 4**) and the 3rd day after de lesion. This reflects the existence of allodynia in females.

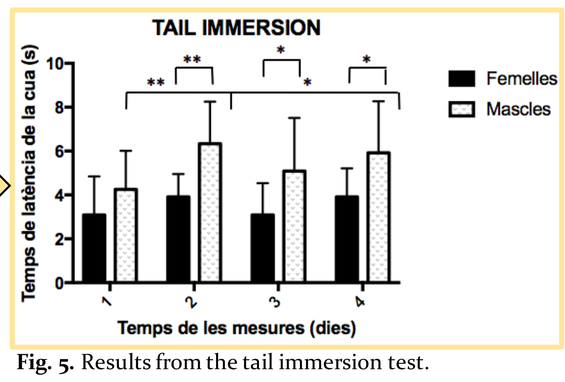

Fig. 5. Results from the tail immersion test.

Results from the tail immersion test

Show a **statistical significance between genders** and, **in males**, between the **days of measure**.

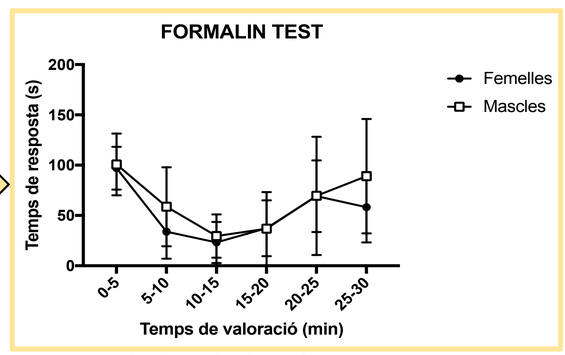

Fig. 6. Results from the formalin test.

Results from the formalin test

Values in this test show that there are not statistical differences between males and females.

CONCLUSIONS

- The present study shows gender differences, when mechanical and thermal stimuli where applied, on our experimental conditions to males and females.
- The results show a large variability between animals and in future studies it is recommendable to increase the number of the subjects tested, in order to get statistical significant results.
- Male and female differences prove the need to perform nociceptive assays in both genders, both in experimental studies as well as in clinical trials.

References

Basbaum, *A. I., Bautista, D. M., Scherrer, G., & Julius, D.* (2009). Cellular and Molecular Mechanisms of Pain. *Cell*.

Fillingim, R. B. (2010). Sex, Gender, and Pain. In The Senses: A Comprehensive Reference (Vol. 5, pp. 253–257).

Bannon, A. W., & Malmberg, A. B. (2007). Models of nociception: hot-plate, tail-flick, and formalin tests in rodents. Current Protocols in Neuroscience, Chapter 8(October), Unit 8.9.